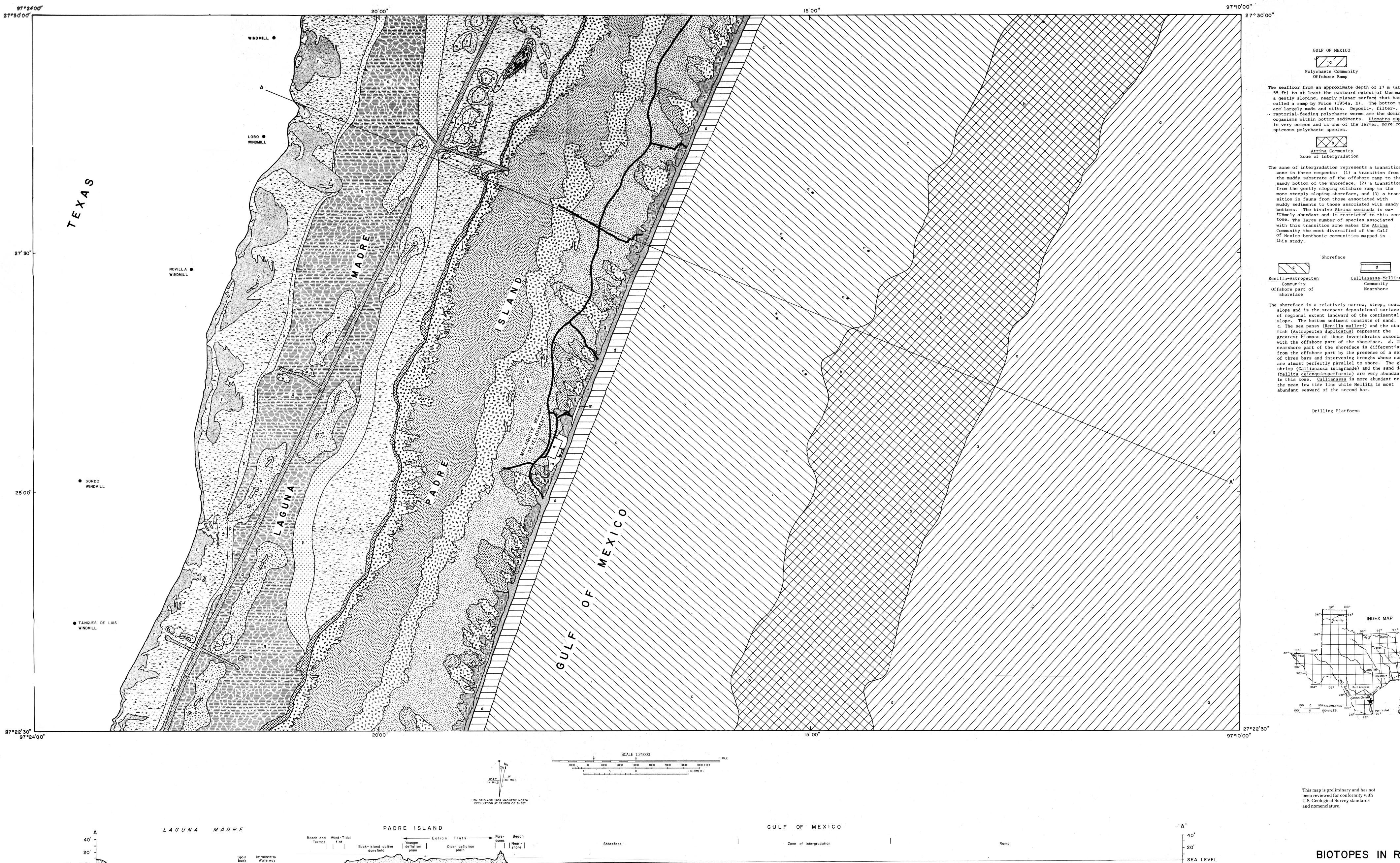
SEA LEVE



VERTICAL EXAGGERATION 40X

GULF OF MEXICO Polychaete Community Offshore Ramp

The seafloor from an approximate depth of 17 m (about 55 ft) to at least the eastward extent of the map is a gently sloping, nearly planar surface that has been called a ramp by Price (1954a, b). The bottom sediments are largely muds and silts. Deposit-, filter-, and raptorial-feeding polychaete worms are the dominant organisms within bottom sediments. Diopatra cuprea is very common and is one of the larger, more conspicuous polychaete species.

> Atrina Community Zone of Intergradation

The zone of intergradation represents a transition zone in three respects: (1) a transition from the muddy substrate of the offshore ramp to the sandy bottom of the shoreface, (2) a transition from the gently sloping offshore ramp to the more steeply sloping shoreface, and (3) a transition in fauna from those associated with muddy sediments to those associated with sandy bottoms. The bivalve Atrina seminuda is extremely abundant and is restricted to this ecotone. The large number of species associated with this transition zone makes the Atrina Community the most diversified of the Gulf of Mexico benthonic communities mapped in

Callianassa-Mellita

The shoreface is a relatively narrow, steep, concave slope and is the steepest depositional surface of regional extent landward of the continental slope. The bottom sediment consists of sand. c. The sea pansy (Renilla mulleri) and the starfish (Astropecten duplicatus) represent the greatest biomass of those invertebrates associated with the offshore part of the shoreface. d. The nearshore part of the shoreface is differentiated from the offshore part by the presence of a series of three bars and intervening troughs whose contours are almost perfectly parallel to shore. The ghost shrimp (Callianassa islagrande) and the sand dollar (Mellita quienquiesperforata) are very abundant in this zone. Callianassa is more abundant near

Drilling Platforms

EXPLANATION

Ocypode Community Beach and related water-laid deposits

The beach is a gently sloping body of sand deposited by waves and currents along the Gulf of Mexico shore. Adjoining the beach and mapped with it are small washover fans and stream alluvium in gaps through the foredune ridge. The ghost crab Ocypode quadrata is the dominant macroinvertebrate found on the beach. Vegetation is sparse with only a few salt tolerant species such as Sesuvium portulacostrum, Uniola paniculata, and Ipomeoea spp. occurring on the backshore.

Uniola Community

Vegetated, relatively stabilized dunes formed by sand blown from the beach by onshore winds occur immediately landward of the beach. Sea oats (Uniola paniculata) is the dominant grass on the foredunes and is important in dune-building. The seaward facing slope of the foredunes is lightly vegetated compared to the back slope. Secondary species found on the seaward slope of the foredunes include Ipomoea spp., Croton punctatus and Senecio riddellii. Paspalum monostachyum is common to the back slope.

Eolian Flats

Vegetated sandy areas: h. Older deflation plains with relatively irregular, indistinct low ridges and intermittently ponded shallow troughs left behind the back-island dune field as it migrated westward during the period preceding 1948. The grass Paspalum monostachyum is the dominant species and is generally more abundant on the low ridges than in the troughs. Algae, Bacoppa monnier, and Hydrocotyle bonoriensis are common to the troughs. Younger deflation plains of relatively welldefined low ridges and intermittently ponded shallow troughs left behind the active dune fields as they migrated westward since 1948. While P. monostachyum is the dominant species, the diversity and types of other vegetation changes according to the relative age of various ridges and troughs. Lower diversity and the presence of pioneer species distinguish newer ridges and troughs from slightly older ridge-

Active Dune Fields

Areas of unvegetated, actively migrating dunes formed of windblown sand. Active dune fields include (1) blowout dune fields formed by localized wind erosion of vegetated dunes, and (2) a back-island dune field adjoining the wind-tidal flats along Laguna Madre.

> Wind-tidal Flats

trough systems.

Flats along Laguna Madre periodically covered by water and composed largely of sand washed and blown from the back-island dunes. Vegetation is limited to small low mounds of sand trapped by roots. Plant species found in this area have a high level of tolerance to salt and include <u>Sesuvian</u> portulacostrum and <u>Salicornia</u>

Artificial Fill

NOTE ON CHANGEABILITY OF MAPPED FEATURES

The distribution of biotopes parallels and is largely controlled by the distribution of geomorphic features. Because the sediments comprising these geomorphic features undergo rapid depositional and erosional changes, this mapping cannot be considered a final record but rather must be thought of as a datum point from which future changes may be measured. As evidenced by comparisons of the latest aerial photographs with older maps and aerial photographs, some features change more slowly than others. Except for the open marine environment, the present mapping is based largely on high-altitude color aerial photographs Different geomorphic features were mapped at different times; therefore, to prevent confusion, the period during

density during drought periods. Geomorphic features on Padre Island were mapped Gulf of Mexico beach, located within 100 m east or west

The section of the Language weether a wind road line of near land

Fine granded sand, bloss on seabed turn the language - from Padro Inland and controlly rodenisting by waves and currents, forming a beach and sub aqueous nearshore terrace along the sant wide of

Lagana 1 loss

Halodule-Halophila

Vegetated Flats Fine-grained shelly sand and muddy shelly sand, forming relatively flat portions of the lagoon floor between the central unvegetated trough and the sheres, o, Vegetated largely by Halophila engelmannii, generally in a narrow zone bordering the trough, p. Vegetated largely by shoal grass, Halodule beaudettei, generally in water shallower than 1 m (1 ft), q. Fine-grained shelly sand

Unvegetated Shoals

erally deeper than 1 m (3 ft), Polychaetes are

forming a centrally located, unvegetated trough gen-

abundant in the bottom mediment with Diopatra cupres

Fine-grained shelly sand and sandy shell gravel in relativaly shallow, topographically irregular areas, mainly along the west side of Laguna Madre,

South Bird Island Beach-ridge Complex Sand, shell gravel, and muddy mand, forming a complex

system of vegetated beach ridges and ponded interridge swales of South Bird Island. 1. Subaertal ridges. f. Ponded swales. u. Shell beach composed of shell gravel and shelly sand, locally comented by calcium carbonate to form beachrock.

Spoil Banks Material largely sand, in part shelly and muddy, cast aside during channel dredging. w. Subaqueous, in part vegetated by Halodule beaudettet, Halophika engelmannii, and Ruppia maritima. X. Intermittently exposed areas which are

unvegetated. y. Subaerial ridges which may be

unvegetated or vegetated.

taken by the National Aeronautics and Space Administration. which each major geomorphic feature was mapped is noted in the short discussion below.

Mapping of the Laguna Madre was based on aerial photos taken January 19, 1973; a day of exceptionally low turbidity in the lagoon. The map derived from the aerial photos was field checked during the summer of 1973. The area covered by subaqueous vegetation has been more extensive during the wet period 1968-1973 than it was during a period of drought and accompanying high salinity in the lagoon when the vegetation was studied by Simmons (1957). Vegetation has increased considerably on the shoals and subaqueous spoil banks during the interval 1968 to 1973. For example, the subaqueoud spoil banks were largely bare in 1968 and were about 50 percent vegetated in 1973. Relative abundances of the various grasses also changed during that period; the Halophila beds either did not exist or were greatly reduced in their distribution and

in 1967-1968 and reported on by Hunter and Dickinson (1970). Biotopes were studied at various times between 1968 and 1973. Relatively high rainfall during this time span resulted in the steady expansion of vegetation and in increasing sediment stabilization. A comparison of present mapping with the coastal survey of 1860-1882 (U.S. Coast and Geodetic Survey, 1887) shows many changes during the last century. That map shows the following landform zones from east to west as described by Hunter and Dickinson (1970): (1) the

of its present position; (2) a vegetated foredune ridge similar in width and position to the present one; (3) an irregular pattern of dunes, largely vegetated, in the middle part of the inland; (4) a low vegetated flat in the western part of the island; and (5) a Laguna Madre shoreline characterized by small lagoons, bars, and spits. Also at the time of this early map there was not a low plain in the middle part of the island as exists today nor was a backisland dune field present.

Geomorphic features and related blotopes found in that part of the Gulf of Mexico mapped in this study are based on data gathered during a number of scientific cruises in 1972-1974. Motopes associated with the open marine environment are probably the most stable of any found in the study area. Major storms, such as hurricanes, produce the most drastic changes in offshore biotopes.

REFERENCES CITED

Hunter, R. E., and Dickinson, K. A., 1970, Map showing landforms and sedimentary deposits of the Padre Island portion of the South Bird Island 7.5-minute Quadrangle, Texas: U.S. Geol. Survey Misc. Geol. Inv. Map 1-159.

Simmons, E. G., 1957, An ecological survey of the upper Laguna Madre of Texas: Inst. Marine Sci.: (Univ. Texas) Publ., v. 4, p. 156-200. Price, W. A., 1954a, Shorelines and coasts of the Gulf

of Mexico, in Gulf of Mexico, its origin, waters, and marine life: U.S. Fish and Wildlife Service Fishery Bull. 89, p. 39-65. , 1954b, Dynamic environments: Reconnaissance mapping, geologic and geomorphic, of continental shelf of the Gulf of Mexico: Gulf Const Assoc,

U.S. Coast and Geodetic Survey, 1887, Coast chart no. 210.

Geol. Socs. Trans., v. 4, p. 75-107.

MAP SHOWING

BIOTOPES IN RELATION TO GEOMORPHIC FEATURES OF A PART OF THE SOUTH-CENTRAL TEXAS COASTAL ZONE, 1968-1973

GARY W. HILL AND RALPH E. HUNTER